

New Species of the Genus *Homalomena* (Araceae) from Sumatra with a Short Note on the Genus *Furtadoa*

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Abstract

Five new species of the genus *Homalomena* (Araceae) from Sumatra are described and their relationships and chromosome numbers briefly discussed. Among them, *Homalomena ruscii* sp. nov. stands out by its free ligule at the petiole base and by its (usual) basal placentation of ovules. *Homalomena mixta* is transferred to the genus *Furtadoa* on the basis of the floral characters.

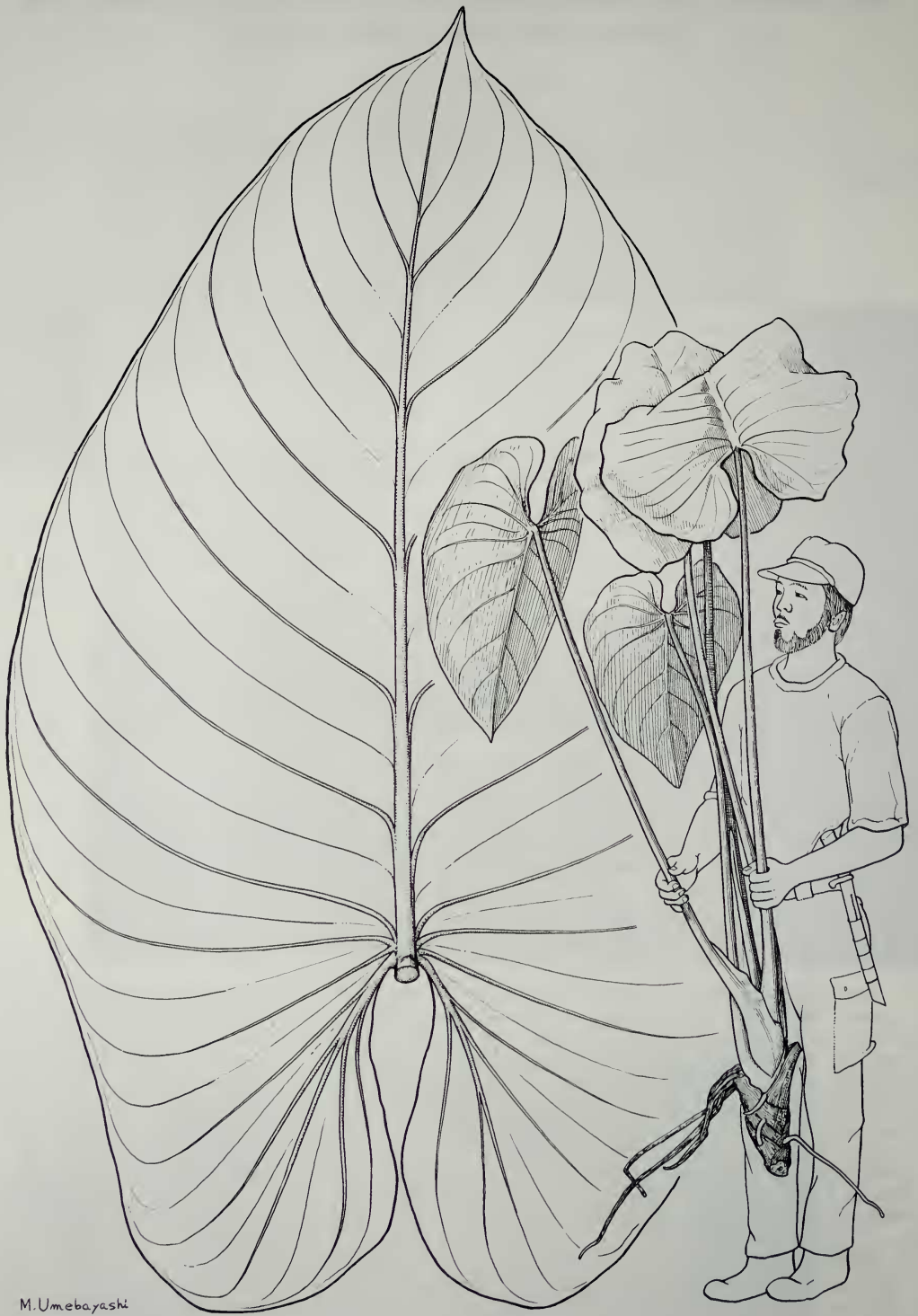
From 1980 to 1984, I had several opportunities to visit West Sumatra as a member of the Sumatra Nature Study (SNS) Project, cooperating in field studies of Andalas University (Indonesia) and Kyoto University (Japan). Members of the Botany Group of the Project had been gathering many herbarium specimens including a rich and good aroid collection (Hotta, 1984), and during those travels I had opportunities to work on the taxonomy of Sumatran flora at the Herbarium Bogoriense and the Singapore Botanic Gardens' Herbarium.

The aroid flora of Sumatra is characterized by a slightly poorer diversity than that of Borneo, especially among those elements that have a limited distribution in the wet tropical region of Malesia. Borneo has 6 endemic genera of Araceae: *Aridarum*, *Bucephalandra*, *Heteroaridarum*, *Hottarum*, *Pedicellarum* and *Phymatarum* but Sumatra does not have endemics since *Furtadoa* once believed to be endemic to Sumatra, has now been found in Malaya (see end of article). On the other hand, in Sumatra, the genus *Homalomena* is rich in species and shows much variation. In this paper, new and interesting species from our Sumatran material of *Homalomena* are described.

Homalomena megalophylla M. Hotta, sp. nov. (sect. *Homalomena*) Fig. 1, 2 & 4A

Herba maxima caudiculo erecto 0.5-1.5 m longo, 8-15 cm crasso. Foliorum petiolus crassiuscule quam lamina 2-plo longior, 1-1.6 m longus, ad $\frac{1}{3}$ - $\frac{1}{4}$, longitudinis vaginatus, lamina subcoriacea, supra obscure viridis, subtus pallide viridis, ovato cordata, 50-80 cm longa, 35-50 cm lata, lobis posticis rotundato-oblongis usque 20 cm longis, lobo antico ovato, acuminato, nervis lateralibus 1. utrinque circ. 3 basalibus, 5-6 costalibus adscendentibus prope marginem sursum curvis. Pedunculi plures usque 25-30 cm longi. Spathae pars inferior oblongo-ovoidea (4)5-6.5 cm longa, 1.5-2.5 cm ampla, pars superior convoluta 7-10 cm longa. Spadicis stipite 3-5 mm suffulti inflorescentia feminea (2.5)3.5-4(4.8) cm longa, 1.5(-2) cm crassa, mascula 6.5-8 cm longa. Flores masculi 4-5(-6) andri. Pistilla oblongo-obovoidea virescentia, stigmatibus discoideo instructa; ovaria inferne trilocularia, placentis 3 in quoque loculo a centro prominentibus, superne unilocularia, placentis parietalibus, ovulis numerosis affixa. Staminodia claviformia. Baccae obovoidea 7 mm longa; semina ellipsoidea 1.5 mm longa.

WEST SUMATRA: Airsirah pass, 850-900 m, July 28, 1984, M. Hotta, H. Okada & T. Kohyama 8 (KYO); between Sungai Dareh and Sijunjung, steep-rocky cliff off the road side, alt. 100-200 m, Aug. 20, 1981, M. Hotta, H. Okada & R. Tamin 104 (Holotypus in KYO, isotypus in BO); Harau, Pajakumbuh, rocky open place at the foot of the hill, alt. 600 m, Aug. 27, 1983, M. Hotta & R. Tamin 299 (KYO).



M. Umebayashi

Fig. 1. *Homalomena megalophylla* M. Hotta
Leaf, $\times \frac{2}{9}$; and habit, $\times \frac{1}{16}$.

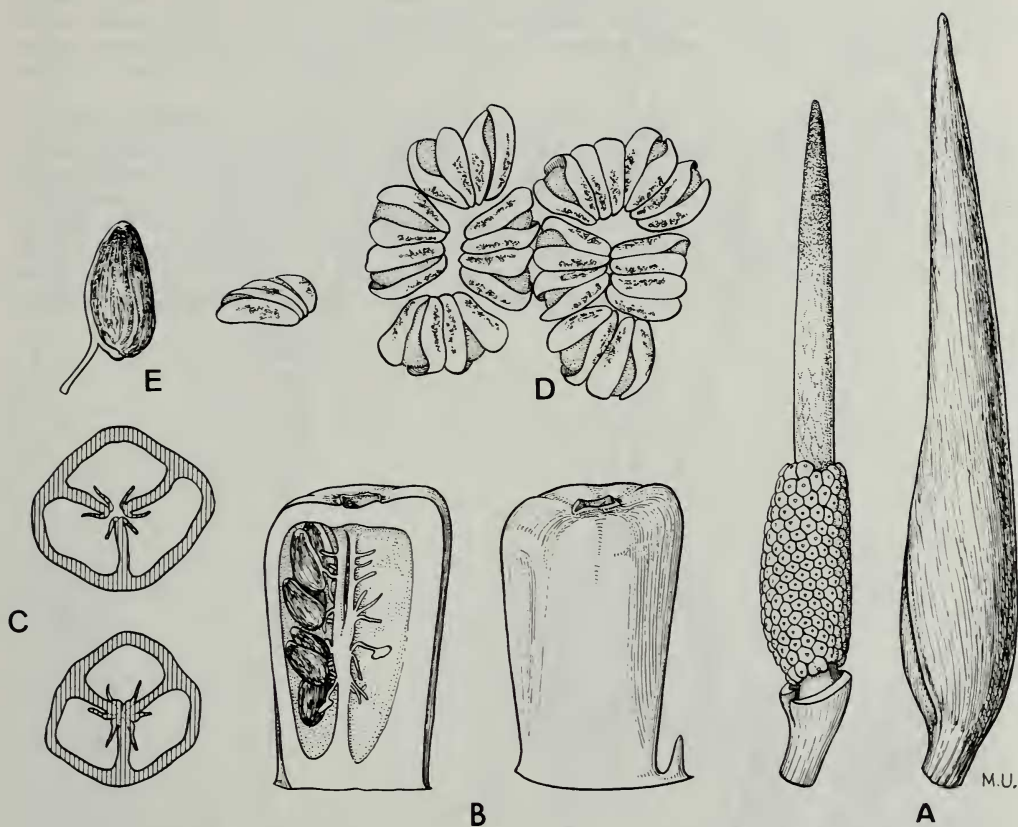


Fig. 2. *Homalomena megalophylla* M. Hotta

A: spathe (right) and fruiting spadix (left), $\times \frac{1}{2}$; B: fruit (right) and its longitudinal section (left), $\times 5$; C: cross-sections of upper (above) and lower (below) parts of ovary, $\times 5$; D: close-ups of two male flowers, front view (right) and a stamen, side view (left), $\times 10$; E: seed, $\times 10$.

This new species is one of the largest plants found among the species of the genus *Homalomena*. It seems to be related to *H. rubescens* (Roxb.) Kunth, the relationship being indicated by the male flower, which has large ovoid pollen sacs attached directly to the surface of the spadix axis (cf. Engler 1912: p. 64, fig. 39, D & E). However, my new species is distinctively different in that it has a constricted spathe and is an extremely large plant. In the latter respect it is like *H. gigantea* Engler but differs from that by the shape of the stamen and that of the spathe.

H. megalophylla is a common and conspicuous aroid on open, wet, rocky slopes in West Sumatra. It is therefore strange that specimens are not found in the Bogor or Singapore herbaria. The chromosome number of this species is $2n=40$ (based on counts in Airsirah clones made by H. Okada, unpublished).

***Homalomena gadutensis* M. Hotta, sp. nov. (sect. *Homalomena*).**

Fig. 3, 4D

Herba majuscula caudiculo erecto 10-40 cm longo, 1.5-2 cm crasso. Foliorum petiolus quam lamina 1.5-2-plo longior, 30-50 cm longus, ad $\frac{1}{3}$ - $\frac{1}{2}$ longitudinis vaginatus, lamina supra viridis, subtus pallide viridis, ovato cordata, 13-25 cm longa, 10-15 cm lata, lobis posticis ovato-triangularis usque 5 cm longis, lobo antico ovato, acuminato, nervis lateralibus 1. utrinque circ. 3 basalibus, 5-6 costalibus adscendenti-



Fig. 3. *Homalomena gadutensis* M. Hotta

A: habit, $\times \frac{1}{2}$; B: spathe (left) and spadix (right), $\times \frac{3}{4}$; C: close-up of female part of spadix, $\times 7$; D: close-up of male part of spadix, $\times 7$; E: female flower (left) and staminode (right), $\times 9$; F: longitudinal section of ovary, $\times 9$; G: cross-section of ovary, $\times 15$; H: ovule, $\times 40$; I: side view (above) and longitudinal section of male flower (below), $\times 10$.

bus prope marginem sursum curvis. Pedunculi plures usque 8-15 cm longi. Spathae pars inferior oblongo-ovoidea 2.5-3.8 cm longa, 1.2-1.5 cm ampla, pars superior naviculiformia, 5-7.5 cm longa. Spadicis stipite 10 mm suffulti inflorescentia feminea 2-2.5 cm longa, 0.5-0.6 cm crassa, mascula 4.5-6 cm longa. Flores masculi (3-)4(-5) andri. Pistilla oblongo-obovoidea virescentia, stigmathe discoideo intracta; ovaria inferne trilocularia, placentis 3 in quoque parietalibus, ovulis numerosis affixa. Staminodia superne obconica, inferne filiformia.

WEST SUMATRA: Ulu Gadut, in forest floor near hill ridge, alt. 500 m, Nov. 29, 1980, *M. Hotta* 25091 (KYO, BO), alt. 550 m, Nov. 29, 1980, *H. Hotta* 25105 (Holotypus in KYO, isotypus in BO); Pinang Pinang, Ulu Gadut, common on forest floor, alt. 400-800 m, Dec. 17, 1982, *M. Hotta*, *H. Okada* & *M. Ito* 88 (KYO); G. Kambot, alt. 400-650 m, Jan. 23, 1981, *M. Hotta* & *R. Tamin* 255 (KYO), 262-b (KYO), 270 (KYO); Gajabuih, common on forest floor, alt. 400-650 m, Jan. 5, 1981, *M. Hotta* 25830 (KYO, chromosome number $2n=38$, cited by Dr. H. Okada, 1984 as *Homalomena* sp. nov. 1), 450-700 m, July 31, 1984, *M. Hotta*, *H. Okada* & *T. Kohyama* 101 (KYO); Batu Bajolang, forest floor near ridge, alt. 400-600 m, *M. Hotta*, *H. Okada* & *M. Ito* 1132 (KYO, BO, AND*).

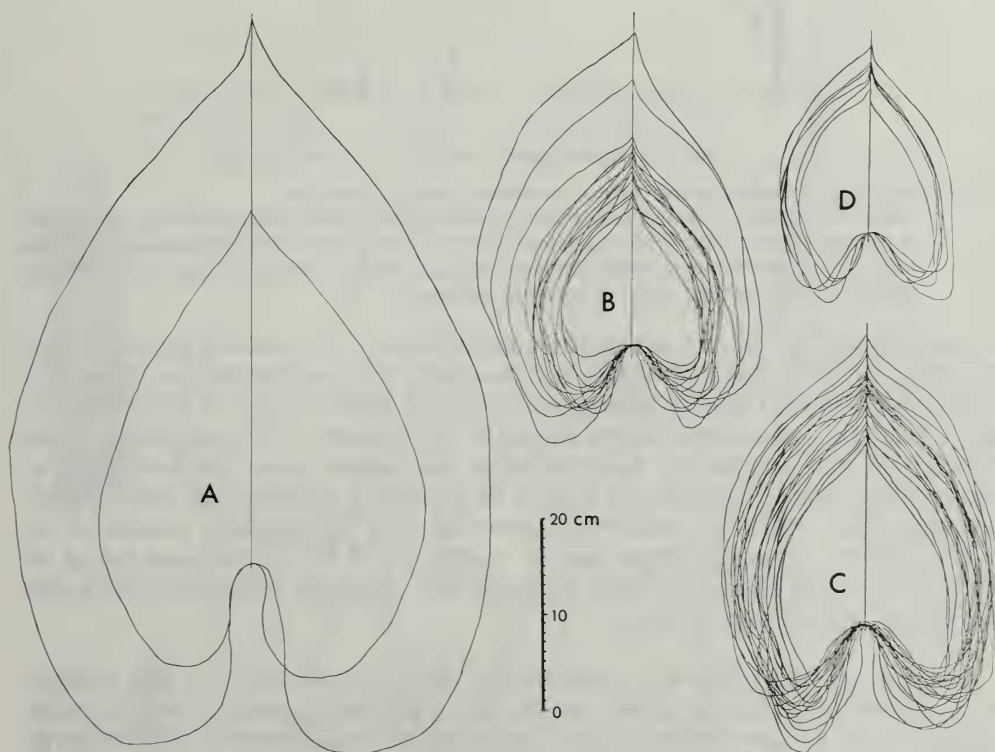


Fig. 4. Leaf shape variation of allied species of *Homalomena* in Mt. Gadut area
A: *H. megalophylla*; B: *H. sagittifolia*; C: *H. pendula*; D: *H. gadutensis*.

H. gadutensis is closely related to *H. sagittifolia*, one of the very variable species in Malesia. Collections of the latter related species in the same group (*H. pendula* group, *H. megalophylla* and *H. gadutensis*) from Mt. Gadut area vary a great deal in shape and size of the leaves (Fig. 4), and in the spathe (Fig. 5). Precise identification of each species in the group could not have been achieved without examining the characters of the spathe and the male flower. The leaf size shows a tendency to decrease as the elevation increases. This tendency is illustrated by measurements of the largest leaf of each collection, after classification using spathe

*AND = Herbarium of Andalas University, Ulu Gadut, Padang, West Sumatra, Indonesia.

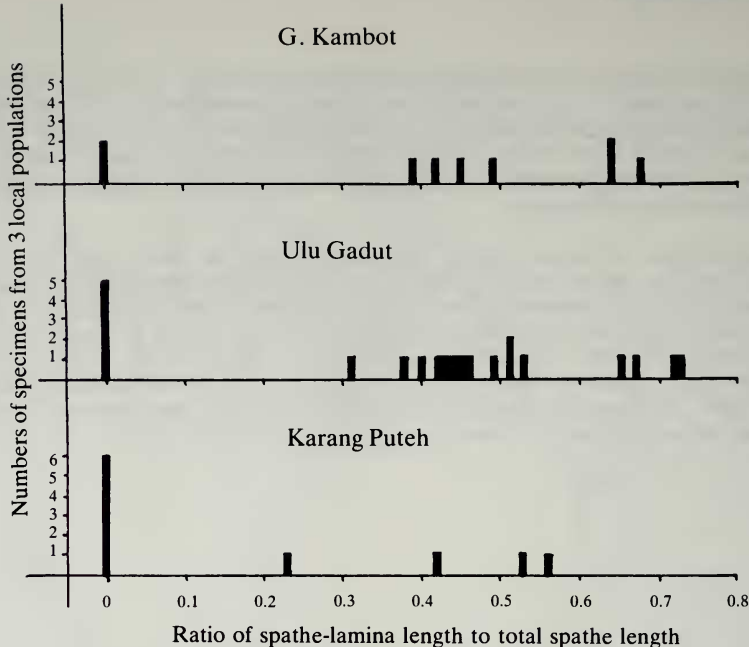


Fig. 5. Variation of spathe of four *Homalomena* taxa in Mt. Gadut area
 Ratio of the length of spathe lamina to the total length of spathe (horizontal axis), and number of specimens from three local populations (vertical axis); ratio 0 = *H. pendula* group (spathe without constriction and undifferentiated into the basal (=tube) part and apical lamina), 0.2-0.6 = *H. sagittifolia*, and over 0.6 = *H. gadutensis*.

characters (see Fig. 5), i.e., (a) spathe unconstricted — *H. pendula* species group, (b) spathe constricted and separable into the spathe tube and the lamina. Group (b) is subdivided into (1) ratio of lamina/total length of spathe 0.2-0.6 — *H. sagittifolia*, and (2) ratio of lamina/total length of spathe 0.6 or more — *H. gadutensis*. From the analysis, it is seen that *H. gadutensis* also has smaller leaves and is a comparatively smaller plant. Besides, the lamina of its spathe is white and boat-shaped, spreading open widely at the time of flowering. The chromosome counts for *H. pendula* group, *H. megalophylla* and *H. sagittifolia* of Mt. Gadut area are in all cases $2n=40$ or 80, but is $2n=38$ for *H. gadutensis*, a number peculiar for the genus (H. Okada 1984 & unpublished).

A variety, *H. sagittifolia* var. *sumatrana* v. Ard. v. Rosen., may at first seem to be *H. gadutensis* on account of the smaller size of the entire plant and its occurrence in a locality at a higher altitude (Talu, Ophir, 950 m, *Bünnemeijer 1299*, lectotype in BO), but this specimen, to my mind, represents a mountain ecotype of *H. sagittifolia* with a spathe-lamina which is rather short; and furthermore, *H. sagittifolia* occasionally does occur on mountains above 1000 m in West Sumatra. This mountain ecotype usually has a tetraploid chromosome complement, $2n=80$, cited by Dr. H. Okada (unpublished).

***Homalomena padangensis* M. Hotta, sp. nov. (sect. *Chamaecladon*)**

Fig. 6

Herba majuscula rhizomate obliquo 3-8 cm longo, 1-1.5 cm crasso, pauce (2-4) foliato. Foliorum petiolus quam lamina 1.5-2-plo longior, 30-40 cm longus, ad $\frac{1}{2}$ longitudinis vaginatus, lamina subcoriacea, supra vertinus nitida, viridis, subtus pallide viridis, cordata, paullum inaequilatera, 15-25 cm longa, 10-15 cm lata, apice breviter acuminata, nervis lateralibus I. utrinque 5-8 adscendentibus leviter arcuatis, nervis secundariis inter primarios numerosis interjectis. Pedunculi usque 3-4 cm longi. Spathae oblonga breviter apiculata, viridis, 2 cm longa, 6-8 mm ampla. Spadicis sessilis oblongi inflorescentia feminea 4 mm longa, quam mascula 4-plo brevior. Flores masculi (1-)3 andri. Pistilla ovoidea virescentia, stigmate discoideo coronata; ovaria bilocularia, ovulis medio affixis. Staminodia crassa claviformia quam ovaria duplo brevior.

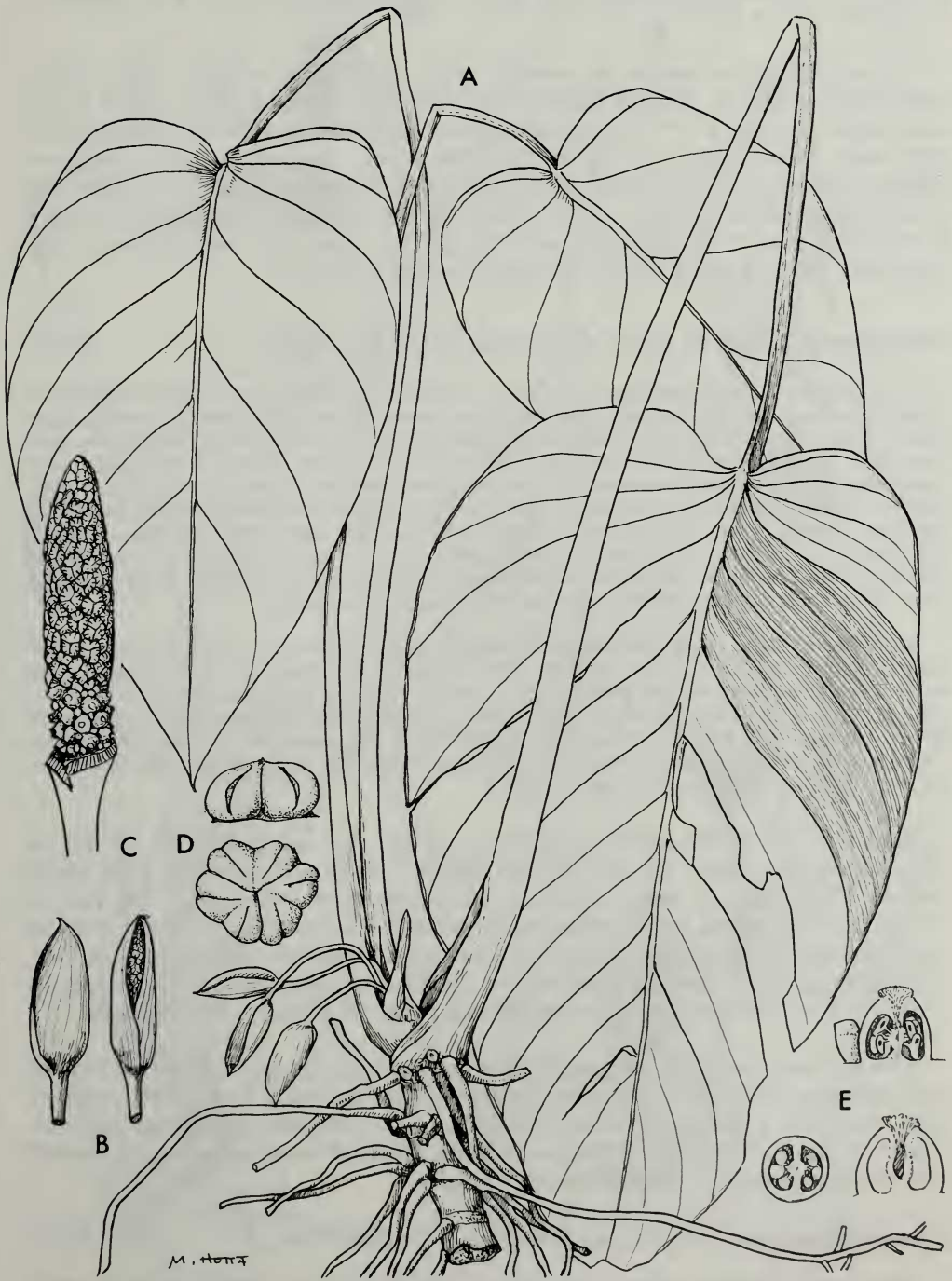


Fig. 6 *Homalomena padangensis* M. Hotta

A: habit, $\times \frac{1}{2}$; B: spathes $\times 1$; C: spadix, $\times 1$; D: male flower, front (below) and side views (above) $\times 12$; E: cross-section (lower left) and longitudinal (lower right) sections of female flower with staminode (above), $\times 8$.

WEST SUMATRA: Karang Puteh, on wet and open limestone cliff, alt. 150-300 m, Feb. 16, 1981, *M. Hotta & H. Okada 344* (KYO, chromosome number $2n=40$, cited by H. Okada 1984 as *Homalomena* sp. nov. 2), alt. 100-200 m, Aug. 14, 1981, *M. Hotta & H. Okada 476* (Holotypus in KYO, isotypus in BOD, AND, SING & L).

H. padangensis seems to be related to *H. griffithii*, a common and widely distributed species in western Malesia, but distinctly differs from the latter by its coriaceous leaf with a velvet-like gloss, cordate leaf base, and the decumbent stem with many strong roots growing out from the nodes.. *H. padangensis* is characterized by the very short filament of the stamen of the male flower (the pollen sac being attached directly to the spadix axis), and the relatively fewer female flowers in the lower part of the inflorescence. This species occurs in a limited area on the limestone hill of Karang Puteh and needs careful protection.

***Homalomena hastata* M. Hotta, sp. nov. (sect. *Chamaecladon*)**

Fig. 7

Herba majuscula caudiculo obliquo 3-5 cm longo, 1 cm crasso, 1-2 foliato. Foliorum petiolus laminae subaequilongus vel ea 2-plo longior, 40-60 cm longus, vagina 4-5 cm longa instructus, lamina supra opaca viridis, subtus pallide viridis, triangulari-oblonga inaequilatera, leviter curvata, basi hastata, apice acuminata, 25-35 cm longa, 10-15 cm lata, lobis posticis triangularis usque 5-8 cm longis, nervis lateralibus I. utrinque circ. 2 basalibus, 4-5 costalibus adscendentibus. Pedunculi usque 5-6 cm longi. Spathae ovoidea 2 cm longa, 0.8 cm ampla, apice cuspidata. Spadicis sessilis inflorescentia feminea 0.7 cm longa, 0.4 cm crassa, mascula 0.8 cm longa. Flores masculi 3 andri. Pistilla oblongo-obovoidea virescentia, stilo cylindrici et stigmate discoideo intracta; ovaria inferne trilocularia, placentis 3 in quoque locullo a centro prominentibus, superne unilocularia, placentis parietalibus, ovulis numerosis affixa. Staminodia elongata claviformia inferne filiformia, pistilla aequantia.

WEST SUMATRA: Along road between Lubuksikaping and Bondjor, Lurah Berangin Nature Reserve, 400-500 m, Sept. 21, 1984, *M. Hotta 30231* (KYO); Pinang Pinang plot, Ulu Gadut, in dense forest floor of limestone area, alt. 500 m, Aug. 25, 1981, *M. Hotta & H. Okada 624* (KYO), Aug. 27, 1981, *M. Hotta & H. Okada 689* (KYO), Sept. 2, 1981, *M. Hotta 26670* (Holotypus in KYO, isotypus in BO), Feb. 6, 1983, *M. Hotta, H. Okada & M. Ito 1082* (KYO, BO); upper part of Pinang Pinang ridge, 700 m, Aug. 1, 1984, *M. Hotta, H. Okada & T. Kohyama 221* (KYO); G. Kambot, alt. 400-600 m, Jan. 23, 1981, *M. Hotta & R. Tamin 269 & 291* (KYO).

In general *H. hastata* can be regarded as a plant well adapted to the habitat on the forest-floor. There are few leaves (usually 1 to 2) with thin and dark green lamina. The petiole is slender and very shortly sheathed at the base. The stem is somewhat decumbent and branches underground. The hastate leaf blade and the long filament of the male flower, both distinctive characters for the section *Chamaecladon*, are also found in this species. The chromosome number of this species is $2n=40$ based on a clone of Pinang Pinang ridge (H. Okada, unpublished).

This new species occurs commonly in and around the Pinang Pinang Plot (one of our study sites for forest ecology on the gentle ridge of Pinang Pinang Hill), and we also found it in a few other places of the Mt. Gadut area and once in northern W. Sumatra (Lurah Berangin). It seems to have a limited distribution in and around the limestone areas of West Sumatra.

***Homalomena rusdii* M. Hotta, sp. nov. (sect. *Chamaecladon*)**

Fig. 8

Herba parvula, rhizomate repente, 3-10 cm longo, 1-1.5 cm crasso, dense foliato. Foliorum petiolus quam lamina 1.5-plo longior vel ei aequilongus, 8-13 cm longus, basi late vaginatus, vagina ovato-triangulare (2.5-3 cm) liguliformi-producta, lamina coriacea, supra nitida viridis, subtus pallidior, lanceolata vel oblongo-lanceolata, 8-11 cm longa, 2-3.5 cm lata, apiculo 2 mm longo cylindriformi, nervis lateralibus I. utrinque 3-4 angulo acuto adscendentibus leviter arcuatis. Pedunculi tenui usque 4-5 cm longi. Spathae oblonga breviter apiculata, viridis, 1.5-2 cm longa, 6-8 mm ampla. Spadicis sessilis

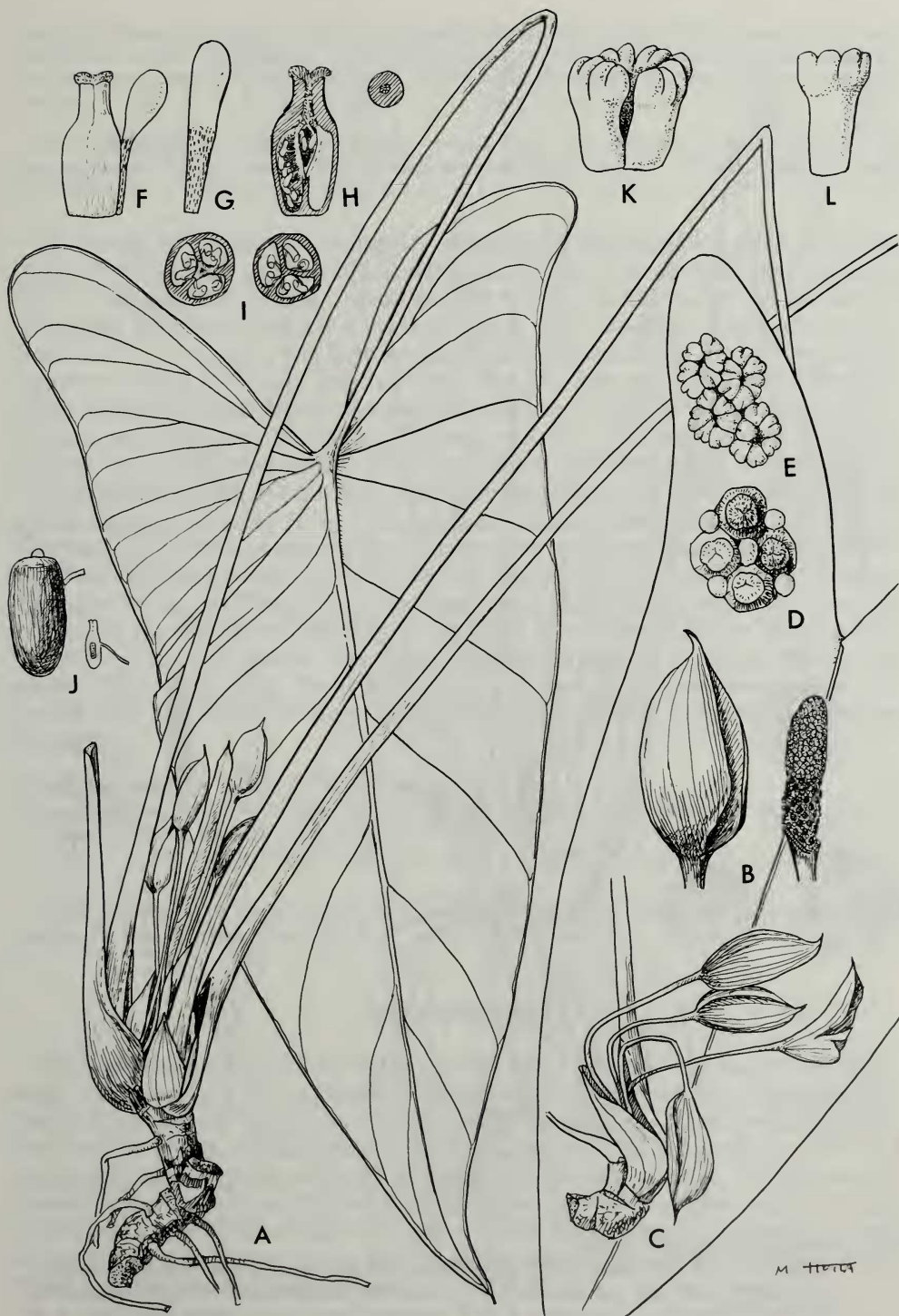


Fig. 7. *Homalomena hastata* M. Hotta

A: habit, $\times \frac{1}{2}$ (Hotta, Okada & Ito 1082); B: spathe (left) and spadix (right), $\times 1\frac{1}{2}$; C: fruiting inflorescences, $\times \frac{1}{2}$ (Hotta & Tamin 291); D: close-up of female part of spadix, $\times 10$; E: close-up of male part of spadix, $\times 10$; F: female flower with staminode, $\times 15$; G: staminode from base of spadix, $\times 15$; H: longitudinal section of ovary (left), cross section of style (right), $\times 15$; I: cross-sections of ovary at upper (left) and lower (right) parts, $\times 15$; J: ovule (right) and seed, $\times 40$ (left); K: male flower (side view), $\times 15$; L: stamen, $\times 15$.

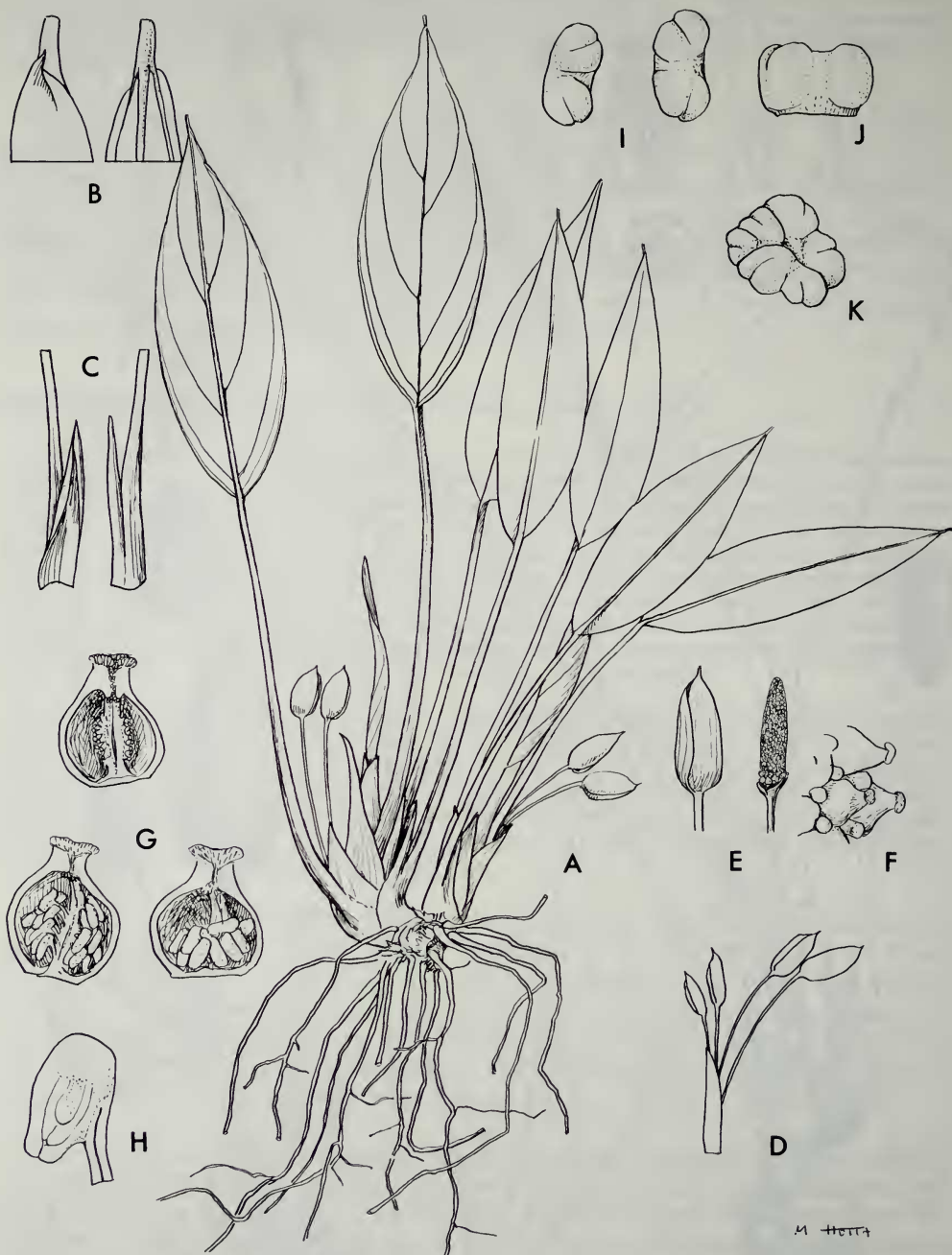


Fig. 8. *Homalomena ruscii* M. Hotta

A: habit, $\times \frac{1}{2}$; B: leaf apices, $\times 4$; C: petiole bases with free ligule, $\times 1\frac{1}{2}$; D: inflorescences, $\times \frac{1}{2}$; E: spathe (left) and spadix (right), $\times 1$; F: female part of spadix, $\times 8$; G: longitudinal sections of 3 ovaries, $\times 13$; H: ovule, $\times 40$; I: stamens (front view), J: stamen (side view), $\times 40$; and K: male flower (front view), $\times 40$.

oblongi inflorescentia feminea 2 mm longa, quam mascula 5-plo brevior. Flores masculi (1-)3 andri. Pistilla late ovoidea virescentia, in stilum brevissimum stigmathe discoideo instructa; ovarium uniloculare, placentis 1, ovulis hemianatropis medio vel basi-affixis. Staminodia claviformia quam ovaria duplo breviora.

WEST SUMATRA: Fort de Kock, Harau, Aug. 5, 1931, *Frey Wyssling 154* (BO); Arau (Harau) Nature Reserve, Pajakumbuh, on wet rock near waterfall, 600 m, Aug. 27, 1983, *M. Hotta & R. Tamin 300* (Holotypus in KYO, isotypus in BO & L).

H. rusdii has the distinct characters of the genus *Homalomena*, such as the free ligule of the petiole-sheath, and a uniloculate ovary with parietal-basal placentation. It is undoubtedly also closely related to *H. paucinervia* by the coriaceous, lanceolate leaf blade with a few primary lateral veins (usually 3-4 on each side). *H. paucinervia* is a typical rheophytic aroid which is widely distributed in West Malesia (Borneo, Malay Peninsula and Sumatra), and two Sarawak collections (*Hirano & Hotta 1284*, and *Hotta 15380*) and one from southern Thailand (collection of Dr. T. Yahara and cultivated in the green-house of Kyoto University) have uniloculate ovaries with basal placentation. This type of uniloculate ovary in *Homalomena* with parietal or basal placentation, has been reported on in *H. minutissima* (Hotta 1967), closely related to *H. humilis* that has no direct relationship with the present species. The peculiar character of the uniloculate ovary in *Homalomena* might have been evolved in a parallel way within two groups. On the other hand, the genus *Furtadoa* of the subtribe Homalomeninae has a uniloculate ovary with basal placentation, but this genus differs from the genus *Homalomena* by the sterile pistil in the male portion of spadix, i.e., a male flower formed by a stamen and a sterile pistil. This interesting floral character is found in *Homalomena mixta* collected from the Malay Peninsula, the second species now assigned to the genus *Furtadoa*.

Furtadoa mixtum* (Ridley) M. Hotta, *comb. nov.

Homalomena mixta Ridley in Jour. Bot. 40: 36 (1902); Engler in Pflanzenr. IV. 23 Da: 80 (1912); Furtado in Gard. Bull. Str. Settl. 10: 209 (1939).

MALAYA. PAHANG: Tahan woods, 1891, *Ridley s.n.* (SING, holotype of *H. mixta* Ridley).

This species has elliptic and wider leaf lamina than *Furtadoa sumatrensis* and seems to be a forest-floor aroid.

Acknowledgments

It is a pleasure to record my thanks to the many persons who helped me in my work. I am grateful to Dr. Kuswata Kartawinata of Herbarium Bogoriense and Dr. Chang Kiaw Lan of the Singapore Herbarium for the use of facilities under their care and for kindly helping with my herbarium work; Dr. Amsir Bakar, Head of Indonesian counterparts of SNS, Andalas University, and Dr. S. Kawamura, Leader of the SNS project, Kyoto University for their encouragement. Mr. Rusjdi Tamin and students of Andalas University kindly co-operated during my recurrent field work in West Sumatra. Dr. H. Okada has carefully made chromosome counts of the new species of *Homalomena*.

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